

REMARKS

Claims 31-40 are currently pending in this application.

Rejection of Claim 31-40 under 35 U.S.C. § 102 (e)

The Examiner has rejected claims 31-40 under 35 U.S.C. § 102 (e) as being anticipated by U.S. Patent No. 6,470,207, (Simon). The Examiner contends that Simon discloses Applicants' invention as claimed. Applicants respectfully traverse the rejection.

Applicants' invention is directed to a method and apparatus for augmented reality guided positioning of an instrument tip within a target located in an object. An augmented reality view is presented by overlaying a virtual graphics guide onto a real view of the object and an instrument. The graphics guide comprises a virtual depth marker located outside of the object. The instrument is aligned to the graphics guide. The instrument is inserted to a depth determined in the augmented view by alignment of a predetermined feature of the instrument with the virtual depth marker. The feature is located along the length of the instrument at a certain distance from the instrument tip and remains external to the object during insertion.

Simon discloses a surgical navigational guidance system which uses one or more fluoroscopic x-ray images. Representations of surgical instruments are overlaid on pre-acquired fluoroscopic images of a patient based on the position of the instrument as determined by a tracking sensor. This allows the physician to see the location of the instrument relative to the patient's anatomy. Simon uses a virtual cone to plan the trajectory of a surgical instrument by moving the instrument in a coordinate system established by the virtual cone. The position of the virtual cone is defined relative to the tracking sensor. A virtual model of the instrument is overlaid on top of an X-ray image of the patient's anatomy. In order to have a spatially correct overlay, the position of the instrument must be tracked.

Appl. No. 09/818,123
Amdt. dated April 24, 2006
Reply to Office Action of January 23, 2006

Applicants respectfully submit that the Simon system is very different than that of the present invention. The present invention is an augmented reality system that allows a user to determine the depth of an instrument being inserted into an object from an external perspective. Unlike Simon, Applicants' invention does not employ a tracking system to determine the position and orientation of the instrument in the 3D world. Whereas, with the tracking information, Simon is able to visualize a model of the instrument on medical images depicting the object's inside, the present invention does not visualize the instrument within the object. Attachment 1 shows an example of an image that would be seen using the Simon apparatus. A virtual model of the instrument is overlaid on an image of the patient's anatomy. The virtual model is tracked to determine its movement with respect to the patient. Rather, the present invention provides a view of the real instrument and uses external indicators (i.e., the virtual depth marker located outside of the object and the feature of the instrument that remains external to the object) to indirectly determine the inserted depth of the instrument as shown in attachment 2. When the marker and the feature are aligned, the user indirectly knows the depth of the instrument within the object. However, the user cannot actually see the part of the instrument within the object. By knowing the distance from the feature to the instrument tip, the user knows how far the instrument has been inserted. The virtual guide is simply used to perform a visual alignment of the real instrument to the virtual guide. Applicants' submit that Simon does not teach or disclose this type of method of system.

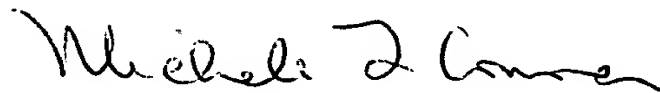
Simon does not teach or disclose a depth marker located outside of the object or a feature of the instrument that remains external to the object as recited in amended claims 31 and 36. Claims 32-35 and 37-40, being dependent upon independent claims 31 and 36 respectively, are also not taught or disclosed by Simon. Applicants respectfully submit that Simon does not teach or disclose Applicants' invention as claimed and request that the rejection under 35 U.S.C. § 102 (e) be withdrawn.

Appl. No. 09/818,123
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Conclusion

Applicants respectfully submit that claims 31-40 are in condition for allowance and request that a timely Notice of Allowance be issued in this case. The Examiner is invited to contact the undersigned should he have any questions in this matter.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michele L. Conover".

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